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## CLAIMS:

1. A digital volume control device to which a digital input signal to be controlled is supplied which provides for a volume controlled digital output signal, the volume control of said digital input signal being determined by a control input signal, characterized in that the digital volume control device further comprises:
  - 5 - conversion means for receiving the control signal in the form of a succession of m-bits words having k active bits at a first sample frequency and converting the control signal into an intermediate comprising a succession of m-bits words having j active bits at a second sample frequency at least  $k/j$  greater than the first sample frequency;
  - averaging means for generating an multiplied signal by multiplying the  
10 intermediate signal with the digital input signal and generating the output signal by averaging the multiplied signal.
2. A digital volume control device as claimed in claim 1, characterized in that the  
15 conversion means comprises an up-sampler for up-sampling of the control signal and a bit-stream converter for converting the up-sampled control signal into the intermediate signal.
3. A digital volume control device as claimed in claim 2, characterized in that the  
20 bit-stream converter is a noise-shaper having a combiner for generating an m-bit combination signal by combining the control signal with an m-bit error signal, a quantizer for generating the intermediate signal by passing-on only the j most significant bits of the combination  
signal setting the remaining bits to zero, and a feed back loop for generating the error signal out of the quantizer errors.
4. A digital volume control device as claimed in any of the claims 1 to 3,  
25 characterized in that  $j = 1$ , whereas the averaging means comprises a shift register for multiplying the intermediate signal with the digital input signal.

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5. A digital volume control device as claimed in any of the claims 1 to 4, characterized in that the conversion means comprises a low-pass filter is provided for filtering the control signal before up-sampling.
- 5 6. A digital volume control device as claimed in claim 5, characterized in that the low-pass filter is an infinite impulse response filter.
7. A digital volume control device as claimed in any of the claims 1 to 6, characterized in that the averaging means comprise a low-pass output filter.
- 10 8. A digital volume control device as claimed in claim 7, characterized in that the low-pass output filter is a infinite impulse response filter.
9. A digital volume control device as claimed in claim 7, characterized in that an up-sampler is provided for up-sampling the digital input signal with a factor  $k/j$ , and the low-pass output filter is formed by a finite impulse response filter having  $k/j$  taps.
- 15 10. A digital volume control device as claimed in any of the claims 1 to 9, characterized in that a dB-to-linear decoder is provided for generating the control signal in dependence upon an  $n$ -bit logarithmic control signal.
- 20 11. A digital volume control device as claimed in claim 10, characterized in that the output signal of the volume device covers a range of about 94 dB, whereas  $n = 6$ ,  $m = 20$ , and  $k = 4$ .
- 25 12. An audio apparatus comprising a digital volume control device according to any of the preceding claims.